the world: the population grew from 19 million in 1952 to 37 million today, and some fear that the doubling time of 23 years may be further shortened.

Another "problem science" is hydraulics (it is, for that matter, an unfashionable science in many other parts of the world). It is of particular importance to Egypt (as witness the predictable but unpredicted waterlogging and salination of thousands of acres of newly irrigated land west of the Delta) and to the rest of the Middle East. Reliance on foreign experts, often accustomed to different circumstances, can be risky.

Egypt's scientific background and talent is precious, as much of it filters to other Arab countries in the form of a drain that is accepted as part of Egypt's role of "big brother." Many students from the Arab world can be found in Cairo and Alexandria, but even more Egyptian physicians, engineers physicists, biologists and other specialists, are working under contract in teaching, research, and executive positions on the Arab peninsula.

Lebanon

Lebanon, which hosts the Centre's regional office for the Middle East and North Africa, also has a special role. Small, almost entirely devoid of natural resources, and a commercial hub of the Middle East since the time of the Phoenicians, it has a strong academic tradition (notably the American University in Beirut) where not only Lebanese, but many expatriates have earned degrees.

Most Lebanese would agree with Dr Joseph Naffah, secretary general of the National Council of Scientific Research, that science per se does not have much prestige, and that this bastion of free enterprise, bordering on sheer laissez-faire, attaches more importance to financial success and to practical and moneyable realizations of science and technology, than to academic palms, international recognition, or the value of science as an integrated part of development.

The approach, thus, is a practical one -not much emphasis on pure science and high-faluting technology, but rather on productive research and industrial expansion. The practical approach is reflected by the policies of the National Council of Scientific Research, whose president, Prof. Joseph Naggear, candidly admits he will

Food from the desert?

Even under an annual rainfall as low as 100 mm, the desert is never completely devoid of vegetation. After the rainy season, it can grow green, yellow, purple and pink. For centuries it has supported nomadic life, made possible by knowledge transmitted from generation to generation.

Today, overgrazing has all but destroyed some of the plant species, particularly the annual plants that are not given a chance to grow to maturity. Little is known of most of these plants (several hundreds of them) except that a little protection, a little care, and a little water, can make them grow like Topsy.

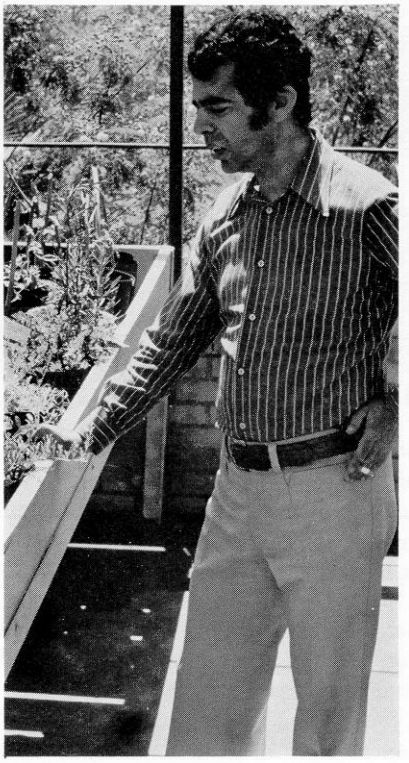
Dr Mohammad Al Shamali, director of the Kuwait Institute for Science Research, has long been intrigued by their potential use, and now a small team of researchers has undertaken a study with the hope of developing inexpensive, locally grown roughage for cattle.

Under the direction of food scientist Ibrahim Hamdan, the project has branched out in several directions.

- Identification of plants, many of which are the same as those found in other semiarid regions (Australia, Arizona, Chile) and about which data is scattered.
- Determination of their nutritive value (content in carbohydrate, proteins and crude fibre) and, eventually, their toxicity. (One perennial plant, Atriplex, was found to have a protein content of 16 percent, as high as alfalfa.)
- Their potential utilization.

Experiments on KISR grounds and in greenhouses have shown that even a slight improvement of the harsh conditions these plants are accustomed to can greatly increase their growth rate. Some perennials grow as tall as a man. And analysis has shown that some of them may be suitable as an economical substitute for more classical grazing plants that are more costly to grow in the semi-arid tropics KISR researchers are now attempting to create an equilibrium between some desert bushes, annuals, and perennial plants; plants imported from regions with similar conditions have been included in the study. It is hoped that a combination of different characteristics may permit a symbiosis between, say, a deep-rooted shady bush, a resistent perennial, and a succulent annual.

Once this preliminary work is completed, experiments with cattle will be undertaken to find out the best way of completing this roughage with other looally-available food, such as single-cell "petroleum proteins," or algae (which are also experimentally grown at the Institute).



Prof. Hamdan with plants.

Desert plant research has also branched out into the study of hormone-like plant growth promoters and soil enzymes that could improve fibers through the fermentation process.

But this is not all. Toxicology studies have led to the identification of alkaloids and other substances, some of which have been analyzed by chemist Ali Anani. An intriguing aspect of the potential of these substances came to light in the particular context of traditional Kuwaiti medicine, probably an offshoot of ancient Arabic medicine, still practiced by a number of healers called attarin, who apparently coexist with free medical services provided by the state. The attarin use herbal medicines whose effectiveness has time and again bee" demonstrated, but they jealously guard their secrets, transmitted from father to so", and even, it appears, mix several inactive ingredients in their preparations to camouflage the active ones.

Already, some plants have been shown to possess antibacterial activity. Soil bacteria and fungi (of which 160 species have been identified in the country) have also been included in the study. An international pharmaceutical firm has shown interest in testing some of the substances. In the meanwhile, the Kuwait Institute for Science Research has acquired 20 square kilometers of desert to push on with the initial cattle-feeding project.